Correspondence.

Gamgee's Zeromotor.

To the Editor of the Scientific American:

Having some few years ago, in conjunction with Mr. Maxwell Lyte, F.C.S., made some experiments with liquid anhydrous ammonia as a motive power, I ask leave to make some remarks on Professor Gamgee's proposed engine; for it seems to me that both he and his critics have failed so far to put the matter in its true light.

You correctly state in your article of the 14th ult., that his engine is analogous to a steam engine which should exhaust into its own boiler. But it would be incorrect to say that such an engine would not work. An engine with a surface condenser, from which it draws the feed water for its boiler, does in fact exhaust into its own boiler. In such an engine heat is first introduced into the water from the heated gases in the fire box and tubes; and after the steam has done its work in the cylinder, it is condensed through the abstraction of heat by a stream of cold water. But the heat introduced in the boiler is found to be in excess of that abstracted in the condenser by an amount directly proportional to the work done by the steam in the cylinder. Consequently a certain amount of condensation has taken place before the steam enters the condenser.

In Professor Gamgee's proposed engine, atmospheric air or water at the same temperature is to be used as the heating medium, as the liquid in the generator is boiling at a much lower temperature. There is no condenser, or, as Professor Newcomb puts it, "there is no external source of cold." There, is, however, an abstraction of heat due to the work done in the cylinder, and to this extent a partial condensation of the vapors, the volume of which, at the initial pressure, being thus reduced, a smaller mass of vapor at the initial pressure and temperature will suffice to force it back into the generator. The balance of a mass of vapor equal to the original mass is then available to do a certain amount of outside work. The heat lost in the cylinder is to be replaced in the generator, as above stated.

It is, then, still the old story of the "*conservation of energy;*" and, theoretically, such an engine, after making its first stroke, ought not, as said by Professor Newcomb, to stop; but, if its parts are all properly proportioned, the cylinder and pipes perfectly non-heat-conducting, and the temperature of the air remain constant, it ought to go on continuously, doing a given duty.

But when we consider it from a practical point of view, we find, first, that a colossal engine will be required to do a very small amount of work.

In a condensing steam engine there is a difference of about 1,000 degrees (Fahr.) of heat between the steam issuing from the boiler and the water returning to it. On the other hand, in Professor Gamgee's engine, this difference will not exceed 60 degrees. There is no advantage to be gained by working with high ratios of expansion in this engine, as the heat converted into energy during the expansion will be restored during recompression. Without going into the question of the relative specific heats of water and ammonia, we may say roughly that, for the two engines to indicate the same power when working at the same number of revolutions, they must have cylinder capacities in inverse proportion to the above differences of heat respectively. Again, in the steam engine the difference of temperature between the gases in the fire box and the water in the boiler is about 2,000 degrees (Fahr.). In Professor Gamgee's engine, if a pressure of 100 pounds per square inch is to be maintained, the difference of temperature between the heating medium and the contents of the generator cannot exceed 60 degrees. We shall not be far wrong in saying that the heating surfaces of the two engines must be in inverse proportion to these differences of temperature respectively. If Professor Gamgee employ a continuous stream of water as his heating medium instead of air, his heating surface may probably be reduced to one-quarter that required for air; but then he is dependent for his stream of water on some force external to his engine, and which might probably be more usefully employed.

It is scarcely worth while going into any more practical objections to his engine, such as the loss of power through priming, leakage, and heat conduction through the parts of the engine, and many other points. I will only point out that a considerable amount of some form of energy will have to be employed to produce the anhydrous liquid ammonia, a great deal of which energy will be lost for any useful purpose in the shape of heat dissipated in the air, or perhaps a stream of water produced for the purpose. His engine will have to do, in order to pay for this, a very much greater quantity of useful work than I believe will ever be got out of it; for I doubt very much myself if it will even overcome its own internal friction.

VALENTINE G. BELL, M.I.C.E.,
Chief Resident Engineer, Jamaica Government Railways.
Kingston, June 4, 1881.

Pin Worms, and How to Get Rid of Them.

To the Editor of the Scientific American:

It is exceedingly desirable that people should know more of the history of *Ascaris vermicularis* (pin worm). Encyclopedias give everything about them excepting what we ought to know, even the pictures. Please give us a paper on the subject, not for scientists, but for parents. I am a man 60 years old, and shall die of them. I know of no relief for their poison but cool injections. Every few weeks they produce diarrhea, and the visible surface of my outflow will give fifty to the square inch, to say nothing of the millions out of sight. After these liberal outflows there is a *short* relief, but only *short*. We wish to know:

1. Where is their original home?
2. How do they enter our body?
3. How many days' incubation?
4. How many days' life?
5. Are not the eggs laid inside as well as outside the bowels?
6. Is it certain that they occupy only about five inches of the rectum?
7. How to be rid of the few left for seed after every looseness?
8. If derived from food, why all persons are not infected?

Please let these eight questions be answered, and oblige, yours faithfully, AN OLD SUBSCRIBER.

Boston, June 6, 1881.

Reply.

To the Editor of the Scientific American:

I take great pleasure in giving your correspondent the benefit of a protracted investigation of pin worms, which resulted in their complete and permanent extermination in the case in which I was immediately interested.

Like all the myriad parasites which afflict humanity, the pin worm probably came to man by migration from some of his poorer relations of the strictly animal world; it is not reasonable to suppose that Adam had them all.

It is commonly held that transmission is now made by the mouth, the eggs being taken in water or on infected food handled by persons afflicted with worms.

The eggs have been found under the finger nails of children and others troubled with pin worms. It is also on record that the worms have been found in the intestines of infants dead *in utero*, indicating either spontaneous generation or the circulation of the eggs in the blood of the mother.

The period of incubation is uncertain, probably three or four days, as it takes about a week for the intestinal tract to become infested after a thorough evacuation of its contents.

The belief that the worms inhabit the rectum only is a mistake. The breeding place of the pest is the cæcum, whence the worms descend or are involuntarily carried to the lower bowels and rectum. For this reason ordinary injections and medicines taken by the mouth afford only temporary relief. To exterminate the pest they must be reached (and the females killed) in the cæcum, particularly in that portion not purged when the intestinal tract is cleared in the ordinary way.

The simplest means of killing the worms the writer discovered by experiment to be by their immersion in *pure water*. Used to the denser secretions of the intestinal tract, the worms absorb water by endosmosis until they burst. Hence the rational and effective remedy by drowning the pests with copious injections of tepid water after the intestinal tract has been thoroughly washed out, the injections being ample enough to surely flood the cæcum.

The injection should be made while the patient is lying on the back; perhaps most comfortably and effectively while lying in the bath. It is best not to depend upon a single irrigation of the cæcum, as some worms may escape in folds of the lining, or eggs enough may be left to perpetuate the pest. A second flooding should be resorted to in three or four days, and to make assurance doubly sure, the flooding may be repeated once a week for several weeks. With patience and care a perfect and permanent cure can be effected. If your correspondent's physician finds nothing to render the treatment suggested inadvisable in his case, he can count on certain and immediate relief. Respectfully,

EXPERIENCE.

Worms 300 Feet Under Ground.

The Gold Hill (Nevada) *News* reports the discovery of a queer species of worms in the face of the Lord Lorne mine, near Lower Gold Hill. The worms occur in a solid stratum of stiff clay, 700 feet from the mouth of the tunnel, and 300 feet below the surface of the earth, amid the vein matter of that portion of the Comstock. Superintendent McDougal found quite a number of them by soaking and washing the clay, and they are no defunct relics of antediluvian times, but are all alive and kicking, incredible as it may appear. These queer little subterranean worms are about three-quarters of an inch long by about an eighth of an inch in diameter, short and thick, resembling some species of grub. Each is incased in a very neat little shell of siliceous material, corrugated and firm, of a bluish cast, like silver ore, with small round spots, having a metallic luster. At his forward end appears a vicious-looking little head, and six legs or feelers capable of being easily folded when he draws back into his shell. On top of his head is a small helmet or cover, of the same material as the shell, so that when he hauls in for a snooze or self-protection his top-piece or helmet just closes the hole nicely. Why this hard shell covering or protective armor, or how it is that these very peculiar worms are found alive at such a depth in virgin ground, is not easy of explanation. Their presence can be accounted for on the score of some deep crack or disturbance of the earth at some time, yet what they are doing there and wha supports them is a mystery, for the clay is no way rich, though it is wormy. They certainly are a great natural curiosity.

AGRICULTURAL INVENTIONS.

Messrs. August W. Brenner and James Fraser, of Coleman, Texas, have patented an improvement in cultivators for cultivating stubble, sugar cane, cotton, corn, and other plants planted in rows or drills, which will remove the soil from the sides of the rows without injuring the roots, and will throw soil around the plants.

Mr. Nelson Dulaney, of Lynnville, Ill., has patented a sulky cultivator, so constructed that the plows can be readily adjusted to throw the soil toward or from the plants, and so that the inner plows can be guided along crooked rows to avoid irregular hills.

Cure for Sea-Sickness.

As "all the world and his wife" seem to be going to Europe this summer, sea-sickness and its cure is one of the most general if not the most popular topics for talk. Three New York doctors were recently interviewed upon the subject. The Brooklyn *Eagle* thus summarizes their opinion. One said there is only one one remedy for it—to stay ashore. But he subsequently admitted that that is not a complete remedy, for he added that land-sickness, caused by riding backward and in railway cars, is the same as sea-sickness. But another doctor, Dr. George M. Beard, says that within a year there is no disease about which so much has been learned, and which is so perfectly curable. It is a disease of the nervous system, mainly of the brain and spinal cord, comes from a series of mild concussions, and produces, by sympathy, disorder of the stomach. The remedy is bromide of sodium, taken three times a day a few days before embarking, and kept up at sea until the danger is passed. It renders the system less susceptible to the disturbances caused by the movements of the ship. The drug must be taken intelligently and on consultation with a physician. Dr. Hammond says that in his own case he has found ten or fifteen drops of chloroform on lump sugar and the use of bromide of potassium beneficial. All three doctors agreed that there is no benefit to be derived from sea-sickness except for those who are in the habit of eating too much. And if people are "the better for it," it is because the sea makes them better in spite of sea-sickness. "No more benefit can be derived from it than from an attack of typhoid fever," says Dr. Beard. If, therefore, it can be prevented without causing any other or any greater harm to the system, people are entitled to the full benefit of remedies that are really such.

The Registration of Plumbers.

A bill for the registration of plumbers and the supervision of all plumbing work by the Health Departments of New York and Brooklyn has been passed by the Legislature at Albany and approved by the Governor. The law with regard to registration will go into effect next March; the more important provisions take effect immediately.

The following rules, drawn up by the New York Board of Health, after consultation with intelligent plumbers and sanitary engineers, will probably be substantially adopted under the new law:

"When the [plumbing] work is completed and before it is covered from view the Board of Health is to be notified, that it may send inspectors, upon whose report the board will act upon its final approval.

"All materials to be of good quality and free from defects; the work to be executed in a thorough and proper manner.

"All the plumbing in the house so placed as to be readily inspected.

"Every soil-pipe and waste-pipe of iron, and extending through and at least two feet above the roof, of undiminished size.

"No traps on vertical soil-pipes or vertical waste-pipes.

"The house drain of iron, with a fall of at least half an inch to the foot, and provided with a proper trap near the street, and with an inlet for fresh air just inside the trap. It should run along the cellar wall, and never be hidden under ground.

"These iron pipes to be sound, free from holes, and of a uniform thickness of not less than one eighth of an inch for a diameter of two, three, or four inches, or five thirty-seconds of an inch for a diameter of five or six inches. Before they are connected they should be thoroughly coated inside and outside with coal-tar pitch, applied hot, or with some other equivalent substance.

"All joints in the soil-pipes and waste-pipes so calked with lead, or with cement made of iron filings and sal ammoniac, as to make them impermeable to gases.

"When lead pipe or trap is connected with an iron pipe, the joint should be made through a metallic sleeve or ferrule, and calked with lead.

"Every sink, every basin, every watercloset, and every tub or set of tubs separately and properly trapped.

"All traps ventilated by a special pipe extending above the roof.

"Every 'safe' under a basin, refrigerator, or other fixture, drained by a special pipe not directly connected with any waste-pipe, drain, or sewer.

"Every watercloset supplied with water from a special cistern, and not by direct connection with the Croton supply.

"No overflow pipe from a cistern to be directly connected with any soil-pipe, waste-pipe, or drain.

"When the pressure of the Croton is not sufficient to supply the cistern a pump should be provided.

"No cistern for drinking water to be lined with lead."